



Reference

# RFID triggers CO<sub>2</sub>-saving cycle for cooling boxes

Re-cycling in the double sense of the word is being realized by a Mannheim-based manufacturer for its modular cold chain system packaging made of expanded polystyrene (EPS): with the first, globally planned, cloud-managed reusable cycle. Trigger and lap counter in the automated evaluation and cleaning of parts before reuse/recycling is proven RFID technology from Siemens. With a forecast of 15 circulation cycles, the new approach is expected to save up to 1,000 kilograms of CO<sub>2</sub> per 333 liter cooling box.

With its unique ICECATCH PROTECT modular system packaging, eutecma GmbH, located in Mannheim (Germany) and founded in 2008 by Markus Baumgärtner and Florian Zeilfelder, is setting standards in terms of environmentally friendly, climate-neutrally-produced cold chain packaging. Users are predominantly well-known manufacturers and logistics service providers in the pharmaceutical industry and, to a lesser extent, in the food industry.

## Highlights of the solution

- Cost reduction through multiple use and simplified, reliable processes
- Flawless parts only in the cycle keep packaging quality consistently high
- Environmental relief through EPS recycling and multiple use
- Usable worldwide thanks to support of various radio specifications
- Worldwide spare parts availability and service from Siemens
- Convenient, web-based commissioning and diagnostics with on-board tools
- Robust, long-term reliable operation thanks to industry-proven UHF technology
- Easy integration into the TIA Portal

The agile medium-sized business is now taking the next step and starting to establish the first global recycling system for its PROTECT cooling boxes and ICECATCH cooling elements.

Means to this end are modularly constructed plants for the automated evaluation, disinfection, and cleaning of ultimately all circulating cooling boxes or system modules (bases, lids, angle parts). These – once requalified – can then be used one more time, or they can be materially recycled in a further cycle to be reused without any loss of quality. With the recycling management project retecma, eutecma GmbH is planning to set up an initial 30 or more so-called Refreshment Centers at locations around the globe that are as close as possible to (large) customers. As a result, once boxes and modules have been delivered, they remain in the respective country and no longer have to be transported back to the manufacturer. "This alone will significantly improve the carbon footprint of our already climate-friendly products and processes, reduce waste, and thus ease the burden on the environment and make supply chains even more sustainable," says Markus Baumgärtner, shareholder and managing director responsible for technology. "Sustainability is a big issue, especially in the pharmaceutical industry. And retecma is our contribution to successfully transform the world of temperature-controlled packaging into a greener future," states sales manager Sven Rölle.

#### **Detect reliably, then evaluate, clean, reuse**

Furthermore, in the future, the various boxes and modules will be reused several times – the Mannheim-based company calls this the retecma

loop – which not only saves fossil raw materials but also energy for the production. Previous studies have shown that with 15 circulation cycles predicted by users, up to 1,000 kilograms of CO<sub>2</sub> can be saved compared to the production of a new 333 liter cooling box and its transport.

Prerequisite for a stable, transparent recycling loop is a reliable system – primarily for identifying the used components. The manufacturer estimates the expected capacity of such a system for large customers at several hundred thousand boxes/modules per year. "Right from the start, we had in mind a largely automated process with contactless detection via radio frequency identification, which largely eliminates human error. This quite often saves a lot of time and thus costs," says Markus Kirstein, project manager for the technical aspect of the retecma project. "We decided on an RFID solution from Siemens because we knew that, in addition to control technology already in use elsewhere, we could get any identification technology from them. This meant that no interface and adaptation problems were to be expected." It was also important that the system met the various international radio specifications such as ETSI, FCC, and others, i.e., that it could be used worldwide.

In dialog with the local sales department and a specialized RFID promoter from Siemens, a feasible basic framework was quickly defined. The task: to reliably identify all parts in the mix as they pass by and to make them known to the control system; in order to then be able to logically initiate, track, and document the subsequent, linear steps and the ejection of damaged parts; so that in the end, only reusable good parts in the best, practically original quality leave the plant(s).

#### **Reliable detection with UHF-RFID**

The SIMATIC RF600 UHF (ultrahigh frequency) RFID system from Siemens is ideal for the detection from a greater distance and, if necessary, in a group. The core components of the first prototype plant are a SIMATIC RF680R UHF reader and four external antennas: in this case of the SIMATIC RF680A type with switchable polarization (horizontal, vertical, or circular) to be able to react flexibly to changing environmental conditions. The antennas, with IP65 protection rating, are arranged in the feeder module



Using RFID and automation technology from Siemens, eutecma GmbH's retecma project launches the first, globally planned recycling loop for modular EPS cold chain system packaging.



Core components of the RFID solution are a SIMATIC RF680R UHF reader (center) and up to four RF680A antennas with switchable polarization for best reading results under all environmental conditions.

of the plant in such a way that good reading results can be achieved quickly under all circumstances. All EPS parts are or will gradually be equipped with a cost-effective (passive, battery-free) SIMATIC RF630L SmartLabel. To avoid damage to these PET labels in the often harsh everyday life, they will be installed protected in the future, which has no effect on the reading quality.

After being fed in (at creep speed), the boxes and modules are scanned as they pass by and identified by the system on the basis of the unique label ID. The sequence control, a compact SIMATIC S7-1200, determines the number of reuse cycles that have already been completed and automatically guides the parts through the subsequent stations. An additional SIMATIC S7-1200F with failsafe CPU monitors the functional safety of the plant.

First step in quality assurance is the weighing of the parts using SIWAREX load cells from Siemens, whereby deviations from the target weight that exceed tolerances are interpreted as defects. The following photo-optical 3D inspection using several cameras and a SIMATIC industrial PC detects even the smallest damage such as dents, holes, pressure marks, and breakages. After passing the inspection, the components, which can basically be reused like new parts, are disinfected with UV-C light and then steam-cleaned. The latter only if it is really necessary to save energy. If the weight of a component is incorrect or if an error is detected during the photo-optical

inspection, the damaged component is sent to a qualified EPS recycling process. Good parts are listed as available in the system by means of their ID.

### Easy to get started – convenient diagnostics

Markus Kirstein and his team familiarized themselves with the possibilities of the SIMATIC RF600 system by using a universal example project from Siemens and adapted the functionality to their requirements in a very short time. That speaks for the simplicity of the solution. The web-based management (WBM) of the readers supports all tasks involved in the integration into SIMATIC automation solutions in the TIA (Totally Integrated Automation) Portal and in the commissioning. From initializing the transponders, setting up reading points, optimizing antenna alignment and response performance to comprehensive diagnostics of all these steps. No additional software is required for this. “Everything is documented in detail – right down to the last error message – and understandable even for beginners,” according to the project manager responsible for technology.

Reader-integrated “UHF for Industry” algorithms automatically adjust the transmission power, filter, and distinguish between own transponders and others – so that only relevant transponder data is transferred to the user program. This quickly creates a high level of process reliability.

To be able to quickly and easily test RFID-relevant program parts during the commissioning of a plant or later during service, the Mannheim-based company is one of the first to use the new



The new SIMATIC RF660M handheld reader, shown here with UHF reading head, provides valuable, time-saving services for diagnostics during commissioning, among other things.

## Security information

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept. For more information about industrial security, please visit [www.siemens.com/industrialsecurity](http://www.siemens.com/industrialsecurity)

Published by  
Siemens AG

Digital Industries  
Process Automation  
Östliche Rheinbrückenstr. 50  
76187 Karlsruhe, Germany

PDF  
Reference  
PDF 1023 4 En  
Produced in Germany  
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SIMATIC RF660M handheld reader with UHF head. When approaching one or more labels, the portable stand-alone device visualizes their ID and signal strength and also reports the latter acoustically, like a Geiger counter. This makes it very convenient to locate tagged parts in and at the plant, read out labels, and write to them, which has proven to be extremely useful for diagnostics during the testing phase.

## Cloud-based transparency and remote services for higher-performing processes

All of this is currently still happening locally, but a global pool system is being planned as a cloud-based solution that will manage all boxes and modules at the various locations. "This will enable us and our customers to keep an eye on the available capacities at any time and from anywhere – making planning even more flexible and needs-based," says Pascal Schiller, project manager responsible for circular economy. The processes can be conveniently analyzed using the data, and any weak points can be quickly identified and eliminated. In addition, those in charge are discussing documenting the product carbon footprint (PCF) of their cooling boxes in the recycling system using the emissions management tool SiGREEN from Siemens and making it completely traceable via the blockchain-based software solution Trusted Traceability. Global remote access to the plants is also planned, probably via the SINEMA Remote Connect management platform from Siemens. In addition to making servicing easier, this also simplifies software updates and the transfer of calibration data for the camera system. "In these areas, too, we expect an integrated solution from a single source to provide significant added value compared to heterogeneous approaches," states Markus Kirstein.



The partners are all around satisfied with the solution (from left to right): Markus Kirstein, project manager technology eutecma; Oliver Mirzwa, promoter RFID Siemens; Pascal Schiller, project manager circular economy eutecma.